

point illustrated by a consideration of the failures is that most of them were fractures with an extreme degree of comminution and with a mixed infection. This type of wound can be readily distinguished on clinical grounds. Sequestrum formation in these circumstances is extremely probable and closure of the wound is best avoided. All the fractures are uniting or have united satisfactorily, even cases such as Nos. 7 and 13, which show very extensive comminution. It is noteworthy that there is only one example of a compound fracture of the tibia and fibula in the whole series, No. 22. This is because these fractures are usually accompanied by extensive skin loss which prevents closure of the wound. Various plastic procedures, such as rotation flaps and pedicle grafts, have had a considerable degree of success in these difficult cases, and this aspect of the problem is being further investigated (Jeffreys, personal communication).

Conclusions

The results obtained in this small series are encouraging, and are in accord with a number of other and considerably larger series published since this paper was written. It is very difficult, however, to assess the value of penicillin or other chemotherapeutic agents in the treatment of these cases as no strictly comparable series treated without these drugs was available. The number of cases is also too small for any accurate conclusions to be drawn, and it is presented as an indication of the way in which the problem of preventing bone infections in compound fractures might be tackled. Comparison with similar cases treated by secondary suture during the last war, but without penicillin or other chemotherapeutic drugs, would be interesting, but time and circumstances did not allow me to consult the literature.

The number of compound fractures which passed through the hospital during the period of this investigation was several hundred, and these cases form only a small portion selected at random of the total. The factors governing closure of these wounds were the extent of the skin loss and the presence of infection. In many cases extensive skin loss prevented secondary suture and this was found to be a factor of great importance. Regarding infection the decision to act on clinical impression of the wound was found to be sound. Those wounds which appeared clean clinically mostly did well, and obviously infected wounds usually broke down. Disappointment was experienced when an apparently clean wound broke down due to the presence of an organism not sensitive to penicillin. Gram-ve pus produced by *Ps. Pyocyaneus* and *B. Proteus*, *B. Coli* was

encountered in a number of cases. It was usually responsible for the delay in healing in those cases classed as "Satisfactory." Bone necrosis did not usually occur in the presence of these organisms unless some other pathogen, usually *S. Aureus*, was also present. Phenoxetol alone or in combination with penicillin might improve these cases, and this is being investigated at the present time.

Penicillin, in infections which are susceptible to it, and other chemotherapeutic agents are undoubtedly of very great benefit, but it cannot be too strongly emphasised that the correct surgical treatment of the wound is the essential to success. A late follow up of the cases was not possible owing to the prevailing instructions to transfer patients to hospitals near their home, as they became ambulatory. At the time of leaving hospital all these fractures were uniting satisfactorily and there were no cases of non-union. All wounds which had healed remained so and there were no cases of late breakdown of the wound.

I should like to thank Sir Walter Haward, O.B.E., Director General of the Ministry of Pensions, for permission to publish this paper. Dr. S. J. Scurlock, Medical Superintendent of Ronkswood Hospital, for his encouragement and advice, and Dr. Lawrence for the bacteriological work. My thanks are also due to my house surgeons, Dr. B. Cluley, Dr. L. Thrower, and Dr. Dencer, and all the members of my surgical team for their help in the treatment of these cases. I am indebted to Mr. Brendon Kerney for the X-ray reproductions and photographs, and to Miss Tysall and Miss Higginson for their help with the patients' records.

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